

REMARKS

Favorable reconsideration of this application, in light of the preceding amendments and following remarks, is respectfully requested.

Claims 1-7, 10-16, 18 and 21-27 are pending in the application. Claim 1 is in independent form. Claim 1 is amended.

Rejections under 35 U.S.C. § 103

Hisai/Hoang

Claims 1, 3-5, 7 and 26 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over *Hisai et al.* (US 2003/0192686, hereinafter “*Hisai*”) in view of *Hoang* (US 2003/0159808, hereinafter “*Hoang*”). Applicants respectfully traverse these rejections for the reasons detailed below.

Bidirectional Coolant Path

The Examiner alleges that, “[r]egarding claim 1, *Hisai* et al. discloses a baking system (fig. 3) having ... a wafer to be baked ... wherein the heat pipe is capable of providing vaporization of coolant therein (see paragraph 56, lines 6-12)[.]” Office Action, p. 3. The Examiner acknowledges on page 3 of the Office Action that:

Hisai et al fail to disclose that the heat pipe is arranged in proximity and external to the plate with the heater disposed therebetween, the heat pipe and the plate being discrete elements and the heater being disposed between the heat pipe and the plate; and a coolant storage tank for supplying the coolant to the cooling element when the plate is cooled and for receiving the coolant when the plate is heated, wherein the coolant is supplied to the heat pipe via a path and the coolant storage tank receives the coolant supplied to the heat pipe via the path, the path being between the coolant storage tank and the heat pipe.

The Examiner alleges on pages 3 and 4 of the Office Action that:

Hoang teaches a loop heat pipe apparatus (referring to figure 1) that includes an evaporator heat pipe (100), a reservoir (110), a coolant supply line (vapor/liquid line as illustrated in figure 1) disposed

between the evaporator heat pipe and the reservoir (illustrated in figure 1), wherein a vaporizable coolant is supplied to the evaporator heat pipe from the reservoir and returned to the reservoir while a device that outputs heat positioned near the heat pipe is heated and cooled (see paragraph 22 and 24). It is noted that the device can be heated and cooled simultaneously since heat is inputted while the fluid flows through the device.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the system of *Hisai et al.* to include the heat pipe, reservoir, coolant supply line, and the function of a coolant being sent to and from a reservoir tank while a device is being cooled as taught by *Hoang* in order to maintain the wafer at a constant temperature, thus preventing deformation in the circuitry of the wafer.

Applicants respectfully disagree.

Claim 1 recites, *inter alia*, “wherein the coolant is supplied into the heatpipe via a path and the coolant storage tank receives the coolant supplied to the heatpipe via the path used in supplying the coolant into the heatpipe, the path being between the coolant storage tank and the heatpipe[.]” emphasis added.

Claim 1 requires that the coolant is supplied and returned via the same path between the coolant storage tank and the heatpipe. Accordingly, claim 1 requires that the path is a bidirectional path.

The Examiner acknowledges that *Hisai* fails to disclose, “wherein the coolant is supplied to the heat pipe via a path and the coolant storage tank receives the coolant supplied to the heat pipe via the path, the path being between the coolant storage tank and the heat pipe.” Office Action, p. 5. The Examiner alleges that *Hoang* repairs the deficiency of *Hisai* by disclosing a liquid/vapor line. Office Action, pp. 3 and 4.

Hoang discloses a liquid/vapor line between an evaporator heat pipe and a reservoir. *Hoang*, FIG. 1. The liquid/vapor line has a first portion (liquid line) that is used in supplying a liquid coolant to a heatpipe 100 and a second portion (vapor line) that is used in returning vapor to a reservoir. The first portion is different from the

second portion and is not a bidirectional path. Specifically, *Hoang* fails to disclose, at least, "the coolant storage tank receives the coolant supplied to the heatpipe via the path used in supplying the coolant into the heatpipe[.]" as recited by claim 1.

Hoang not Combinable With Hisai, Teaching Away

The Examiner alleges it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the system of *Hisai* et al. to include the heat pipe, reservoir, coolant supply line, and the function of a coolant as taught by *Hoang* in order to maintain the wafer at a constant temperature. Office Action, page 4, lines 5-9.

Applicants respectfully disagree.

Hisai discloses a completely different cooling method from *Hoang*, and the teachings of *Hisai* and *Hoang* are not combinable. *Hisai* is directed to indirect cooling and disparages direct cooling. *Hoang* is directed to direct cooling.

Referring to paragraphs [0056]-[0059], *Hisai* discloses that a mounting face 11a of a holding table 11 is cooled by heat exchange between a cooling pipe 21 and steam. The heat exchange arises in an inner space 12 of the holding table 11. Referring to paragraphs [0068]-[0072], *Hisai* provides disclosure related to a temperature adjustment control. The temperature of the mounting face 11a is controlled by heat exchange and a substrate W loaded on the mounting face 11a is cooled. As a result, the cooling pipe 21 and a CPU 32 disclosed in FIG. 3 of *Hisai* are elements cooling the substrate W loaded on the mounting face 11a by heat exchange, and *Hisai* does not disclose an element to maintain a constant temperature of the steam in the inner space 12. The temperature of the steam varies according to temperature of the substrate W and the cooling pipe 21 absorbs latent heat of the steam by heat exchange between the cooling pipe 21 and the

steam. Accordingly, the substrate W is indirectly cooled by the cooling pipe 21.

Specifically, the cooling pipe 21 and the CPU 32 are provided to absorb the latent heat of the steam by the heat exchange between the cooling pipe 21 and the steam in the inner space 12. The cooling pipe 21 and the CPU 32 of *Hisai* do not maintain the temperature of the steam at a constant value. *Hisai* discloses several effects such as a uniform temperature distribution and performance of an efficient heat exchange. *Hisai*, paragraphs [0078-0080].

Hoang discloses a direct cooling method in which a liquid coolant supplied to a heatpipe 100 is evaporated to absorb heat transferred to the heatpipe 100. "Tight temperature control is accomplished in the ALHP by regulating the mass flow rate of the auxiliary pump ("AP") to maintain the loop temperature at a desired level." *Hoang*, paragraph [0008], emphasis added.

In *Hoang*, the temperature of the cooling medium is controlled to transport heat from a controlled device (cooling pipe to controlled device), while in *Hisai*, the temperature of a mounting plate is controlled and the mounting plate is cooled by a working liquid 16 in an inner space 12 that is itself cooled by the heat pipe (cooling pipe to steam (inner space 12) to mounting plate). Accordingly, the apparatus of *Hoang* is not combinable with the apparatus of *Hisai*.

Further, *Hisai* teaches away from a direct heat transfer system. *Hisai* discloses that preventing direct heat transfer makes it possible to rapidly perform a cooling process while keeping an even temperature distribution. *Hisai*, Abstract. *Hisai* disparages a prior art direct cooling method in paragraph [0078] (lines 10-20).

Therefore, Applicants respectfully submit that the disclosures of *Hisai* and *Hoang* are not combinable, and *Hisai* teaches away from using direct heat transfer as disclosed by *Hoang*.

No Disclosure of A Thermostatic Element

Claim 1 recites, *inter alia*, “a thermostatic element maintaining an approximately constant temperature of the coolant supplied into the heatpipe when the plate is cooled[.]”

The Examiner alleges that, “*Hisai* et al. discloses … a thermostatic element (CPU 31) adapted to maintain an approximately constant temperature of the coolant supplied into the heat pipe when the plate is cooled [see paragraph 62; the thermostatic element as taught by *Hisai* et al. has appropriate structure to perform this intended use function].” Office Action, p. 3.

The cooling pipe 21 of *Hisai* is used for heat exchange with steam. Accordingly, *Hisai* discloses that a temperature of the mounting face 11a is controlled and not “the coolant supplied into the heatpipe” as required by claim 1. *Hisai*, paragraph [0064]. Accordingly, the CPU 31 of *Hisai* does not read on the thermostatic element described in claim 1, as alleged by the Examiner.

“A functional limitation is an attempt to define something by what it does, rather than by what it is (e.g., as evidenced by its specific structure or specific ingredients). MPEP 2173.05(g).

Applicants respectfully note that intended use is not the same as functional language, and that claim 1 recites functional language and not intended use. Functional language is used to describe the function of an apparatus. Intended use is a description of what a device will be used for. So, for example, a description of a hair curler as a heat emitting device is a description using functional language requiring a structure that emits heat, while a description of a hair curler as being for hair curling is intended use. See MPEP 2111.02 (II).

Nonobviousness

For at least the reasons stated above, *Hisai* is not combinable with *Hoang*. Further, even assuming, *arguendo*, that *Hisai* were combinable with *Hoang* (which Applicants disagree with), *Hisai* in view of *Hoang* cannot render claim 1 obvious. Claims 3-5, 7 and 26 are patentable at least by virtue of their dependency from claim 1. Withdrawal of the rejections and allowance of claims 1, 3-5, 7 and 26 are respectfully requested.

Rejections under 35 U.S.C. § 103

Hisai/Hoang/Hara

Claims 6, 12-16, 18 and 21-24 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Hisai* in view of *Hoang*, and further in view of *Hara* et al. (US 5,413,167, hereinafter “*Hara*”). Applicants respectfully traverse this rejection in that even assuming *arguendo* that *Hoang* and/or *Hara* could be combined with *Hisai* (which Applicants do not admit), the combination of references fails to render even claim 1 obvious because *Hoang* and *Hara* suffer from at least the same deficiencies as *Hisai* with respect to claim 1. Therefore, even in combination, *Hisai* in view of *Hoang* and *Hara* fails to render claims 6, 12-16, 18 and 21-24 obvious because claims 6, 12-16, 18 and 21-24 depend from claim 1. Withdrawal of this rejection is requested.

Rejections under 35 U.S.C. § 103

Hisai/Hoang/Leffert

Claims 2, 10, 11, and 25 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Hisai* in view of *Hoang*, and further in view of *Leffert* (US 3,621,906). Applicants respectfully traverse this rejection in that even assuming

arguendo that *Hoang* and/or *Leffert* could be combined with *Hisai* (which Applicants do not admit), the combination of references fails to render even claim 1 obvious because *Hoang* and *Leffert* suffer from at least the same deficiencies as *Hisai* with respect to claim 1. Therefore, even in combination, *Hisai* in view of *Hoang* and *Leffert* fails to render claims 2, 10, 11, and 25 obvious because claims 2, 10, 11, and 25 depend from claim 1. Withdrawal of this rejection is requested.

Rejections under 35 U.S.C. § 103

Hisai/Hoang/Komino

Claim 27 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Hisai* in view of *Hoang*, and further in view of *Komino* (JP 5,315,293, hereinafter “*Komino*”). Applicants respectfully traverse this rejection in that even assuming *arguendo* that *Hoang* and/or *Komino* could be combined with *Hisai* (which Applicants do not admit), the combination of references fails to render even claim 1 obvious because *Hoang* and *Komino* suffer from at least the same deficiencies as *Hisai* with respect to claim 1. Therefore, even in combination, *Hisai* in view of *Hoang* and *Komino* fails to render claim 27 obvious because claim 27 depends from claim 1. Withdrawal of this rejection is requested.

CONCLUSION

In view of the above remarks and amendments, Applicants respectfully submit that each of the pending rejections has been addressed and overcome, placing the present application in condition for allowance. A notice to that effect is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to contact the undersigned.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact the telephone number of the undersigned below.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

HARNESS, DICKEY, & PIERCE, P.L.C.

By

John A. Castellano, Reg. No. 35,094
P.O. Box 8910
Reston, Virginia 20195
(703) 668-8000

JAC/AXV:jrm